ELECTROLUMINESCENT TAPE FOR BACK-LIT SIGNS AND STORE FRONTS

By Pierre Willermet

Background. When I began installing lighting on my layout using incandescent and LED lights, I found it was difficult to simulate modern internally lit signs and billboards (figure 1), as well as neon lights (figure 2). Lit store fronts with interior detail near the edge of the layout worked well, but further back the lit interiors were difficult to see, as well as time consuming to build. The problems were twofold: 1) Since lamps are nearly point sources, I was not able to get the even lighting I wanted, and 2) Signs often ended up being thicker than I wanted. One way to get around these problems was to use electroluminescent tape (light tape) as a light source. Electroluminescent light sources are in use in many applications, such as automobile dashboard lights, but I, like many others, was unaware of it until I found out about it by chance. The technology has been adapted for model railroading commercially. Signs, often animated, are available and are advertised in the model railroad press. My intent is not to duplicate these, but to make signs, etc., relevant to my pike.

Light tape. Technical and end use information can be found in abundance on the internet by searching under “electroluminescence”. Vendor and practical use information can be found by searching under:

- Electroluminescent tape
- Electroluminescent panel
- Electroluminescent wire
- Electroluminescent paint

My source for materials was Electro-LuminX® Lighting Corporation, but a number of options are available. Since my hands-on experience to date has been with light tape, I will only discuss that application of electroluminescence, but as an aside, Jeremy Mackie of the Redford Model Railroad Club has used orange electroluminescent wire to simulate the flow of molten steel in a steel mill to good effect.

Light tape (figure 3) has a number of features which make it an interesting modeling material. It is thin (~0.030”), flexible, can be cut into different shapes, and emits light from one side. Power supplies provide high voltage (~260 VAC) and frequency (~800 Hz), but at low amperage. While shorting the power supply across your fingers (as I have done) will not injure you, it will focus your attention. This is one reason, along with protecting the tape, that the tape is supplied coated with a plastic barrier film. If desired, you can buy replacement barrier tape, use masking tape or leave the contacts bare.

Figure 4 shows a cross-section of the tape. The current flows from one rear electrode to the other, passing through a dielectric layer and the light-emitting phosphor layer. The electric current excites the electrons in the phosphor, resulting in the emission of light. Since the
electricity must flow between the electrodes, cutting the tape in such a way as to prevent this from happening will result in no light being produced (figure 5).

Vendors can supply devices to attach wiring to the tape, but these are somewhat cumbersome, especially in small scales. I did not use these, but attached wiring to the tape myself. The first step is to carefully peel back the plastic barrier film next to the rear electrodes where you want to attach the wires (figure 7). This is the only tricky part in the process. I did this with a sharp X-Acto® no. 11 blade worked slowly between the film and the electrode, then, when I got some separation, I peeled off the film to expose the area I wanted to attach the wires to. The difficulty is that the film adheres to the electrode and thus it is easy to cut the electrode material or to tear it when you peel back the film, but if I can do it, so can you.

Solder fine (e.g. 30 gauge) wires to copper foil to make a small (~1/4” square) flat area (figure 8). Attach these to the electrodes using conductive cement (Radio Shack). After the cement dries, coat the contact with CA glue to make the bond stronger. If desired, you can cover the electrical contacts with replacement tape (obtained from the vendor) or, e.g., masking tape.

Graphics. Graphics can be obtained from photos, translucent decals, or computer generated graphics. It is best to print or mount graphics on a transparent surface, such as overhead projector film or “window decal film” (Office Depot) applied to clear polystyrene, although translucent material like paper will work in some cases. I sprayed a thin coat of flat fixative to the graphic to protect from handling.

Making signs. Making stand-alone signs is straightforward. Two cases are shown in figures 6 and 7. Examples are shown in figures 8-10.

Store fronts and windows. Windows with illuminated signs and neon lights are shown in figure 11 mounted in a background cardboard building. These were made using Microsoft PowerPoint graphics and text, printed out on overhead projector film. The images were then taped behind the cut-out windows. Light tape was taped behind the graphics.

Illuminated store fronts were made by first photographing store fronts at night (figure 12) using a digital camera. The photos were then transferred to a computer and sized to scale, then printed out on film. The illuminated areas (i.e. windows and doors) were measured and cut out of the material (e.g. styrene sheet) to be used for the building front. The illuminated areas on the transparent sheet were taped in back of the building front, then light tape was taped behind. Illuminated signs were made using PowerPoint software and mounted at the top of the store front. In my case, I put several buildings together and made a mini strip mall (figures 13 and 14). Your applications are limited only by your modeling era and your imagination.

Conclusions.
  • Electroluminescent tape is an effective means of making your own back-lit signs and store fronts.
• You can simulate neon lights, make up your own store windows and signs using software, or use photos.

In conclusion, I wonder what other technologies are around us we can use to broaden our chosen hobby.

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FIGURES

Figure 1) Strip mall signage
Figure 2) Window with neon lights

Figure 3) 1” wide white light tape
Figure 4) Light tape cross section
Figure 5) Cut shapes and wiring

Figure 6) Rectangular signs

Figure 7) Odd shaped signs

Figure 8) Welcome to Mungo Park

Figure 9) Sign made from a business card

Figure 10) Sign printed on paper
Figure 11) Windows from PowerPoint

Figure 12) Store front photo

Figure 13) Strip mall at Port Delaware

Figure 14) Strip mall at night  Moon is light tape mounted on the back drop